ABSRACT

The present invention is thus directed to methods and apparatus for decreasing pressure in a first portion of a vessel of the cardiac structure of a patient by implanting a shunt communicating with an area outside said first portion, whereby a volume of blood sufficient to reduce pressure in said first portion is released. Preferably, the first portion comprises the left ventricle and the pressure reduced is the end diastolic pressure, which is accomplished by having the shunt communicate with the left ventricle so a small volume of blood is released from the left ventricle to reduce the end diastolic pressure. Most preferably, the shunt selectively permits flow when a pressure differential between the left ventricle and another chamber of a heart above a threshold pressure, whereby shunting is prevented during left ventricular systole, or, alternatively, selectively permits flow when a pressure differential between the left ventricle and another chamber of a heart is between a lower threshold and a higher threshold, whereby shunting is again prevented during left ventricular systole. In certain embodiments a semi-passive check-valve is controlled and actuated by an external signal, either using a signal generated by an intra-corporeal electrical battery or an externally coupled energy source. In certain embodiments, the shunt has a pump with an input connected to the left ventricle, or other portion with excessive pressure, and an output connected to a volume of lower pressure. The preferred method of implanting the shunt to effect the present invention is by deploying a tubular element having two ends and a tissue affixation element disposed at each of said ends via a catheter, preferably, the fixation element is a shape retaining metallic material that returns to its original shape as part of the retention aspect of its function. In preferred embodiments of the apparatus, the tubular element is comprised of a biologically inert non-metallic material .